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TITLE

PONDEROSA PINE DEPLETION BY INSECTS AND RESTOCKING BY GROWTH OF PODES ON CASCADE1 TREE SELECTION PLOT (1919-1941) WITH PLANS FOR FURTHER STUDIES

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Forest Insect Laboratory
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PONDEROSA PINE DEPLETION BY INSECTS AND RESTOCKING BY GROWTH OF POLES ON CASCADEL TREE SELECTION PLOT (1919-1941), WITH PLANS FOR FURTHER STUDIES

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PONDEROSA PINE DEPLETION BY INSECTS AND RESTOCKING BY GROWTH OF POLES ON CASCADEL TREE SELECTION PLOT (1919-1941), WITH PLANS FOR FURTHER STUDIES

The Cascadel tree selection plot of 80 acres was set up in 1926 by the Bureau of Entomology (1) on the Sierra National Forest in Site III ponderosa pine stands. Its main purpose was to study the causes of tree selection by the western pine beetle, Dendroctonus brevicomis Lec. Since 1927 the pressure of other insect problems prevented studies from being directed toward this objective. In 1931 (2) an attempt was made to evaluate losses when control work in the Cascadel area was undertaken to break up a western pine beetle epidemic. During the years following, records and studies on the plot were suspended.

In 1940 a complete check of the entire plot was made for two reasons: (1) to determine how many of the trees recorded originally had succumbed to insect attacks since the plot was established; and (2) to determine how many new trees had grown to merchantable size from poles. This inventory was made with the aid of a detailed map showing the location of every tree. Only five green trees on the entire plot had lost their numbers, but they were quickly identified and renumbered. All dead trees were likewise identified by their position on the map. New merchantable-sized trees were numbered, mapped, recorded, classified, and cored. The annual rings from each core were measured back to 1926.

The purpose of this memorandum is to bring the loss record up to date, to show how restocking by the growth of poles into merchantable-sized trees has made up for the loss, and to determine what plans should be considered in continuing this study in line with the objectives as set up by Person when the plot was established.

Person's four original objectives are:

1. To check the results obtained in earlier studies, particularly in regard to growth rate selection.

2. To determine the type of tree most susceptible to attack by D. brevicomis and in what respects it differs from the average for the stand.

3. To determine the degree of selection under different conditions of infestation and growth rate of the stand as a whole.

4. To determine how the tree selection habits affect the rise and fall of epidemics.

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(1) Person, H. L. Sample Plot Studies of Tree Selection by the Western Pine Beetle (Dendroctonus brevicomis Lec.) Report, Jan. 1929.

(2) Struble, G. R. Cascadel Tree Selection Plot--Study of Losses and Application of Tree Selection Theory--Season of 1931. Report, May 11, 1932.

Depletion and Restocking

At the time the plot was set up in 1926 the number of green and insect killed trees marked and recorded were as follows:

Condition of Trees	Number	Volume
Green	1,389	1,088,360
Killed by insects - prior to 1923	18	23,330
1923 to 1926	63	57,720
Total	1,470	1,169,410

From 1926 to 1940 a total of 226 trees having a volume of 230,470 board feet were killed. Owing to the intermittance of records, a year by year comparison of losses is impossible. The best grouping we have to show when the heaviest losses occurred is as follows:

Dates of Kill	Entire Plot		Loss per Acre	
	Trees	Volume	Trees	Volume
1927 to 1931	141	141,610	1.76	1,770.00
1932 to 1937	77	77,340	0.96	966.75
1938 to 1940	8	11,520	0.10	144.00
	226			

A trend upward to a peak is shown in 1931, then a sudden drop back to low endemic conditions prevalent at the present time. The decline after 1931 is attributable in part to insect control work undertaken at that time, and partly to a complex of other factors not yet determined.

Restocking by poles which have grown into merchantable size since 1926 amounted to 403 trees having a volume of 58,670 board feet. By diameters these are grouped as follows:

Diameter (inches)	Trees	Volume
12	167	19,190
14	153	22,070
16	61	11,450
18	17	4,140
20	3	940
22	2	880
Total	403	58,670

The stocking as of January 1941 is recorded as follows:

Condition	Trees	Volume
Originally recorded trees still surviving	1,163	857,890
New green trees grown up from poles	403	58,670
Total number of living trees on plot	1,566	916,560

Present Insect Activity and Condition of Stand

The activity of the western pine beetle is now at a lower point than at any time since the plot was established and this condition promises to remain for some time according to present indications. For example, the only tree killed by D. brevicomis on the entire plot during 1940 was previously struck by lightning. One other tree about to die contained incipient flatheads. Insect activity in the Cascadel area, as in other units of the Sierra National Forest, is at a low level.

The stand on the plot as a whole appeared to be in excellent condition. This observation is further substantiated by measurements of growth taken from cores of the new green trees. They show a rapid rise in growth since 1934. For example, the average growth rate of 94 trees in 1939 was more than twice that for 1934. The upward growth trend started in 1935 for the first time in all years dating back to 1926. (See growth chart attached). While no measurements of growth were made on originally marked trees, there is every reason to believe that they too have increased in rate of growth since the epidemic.

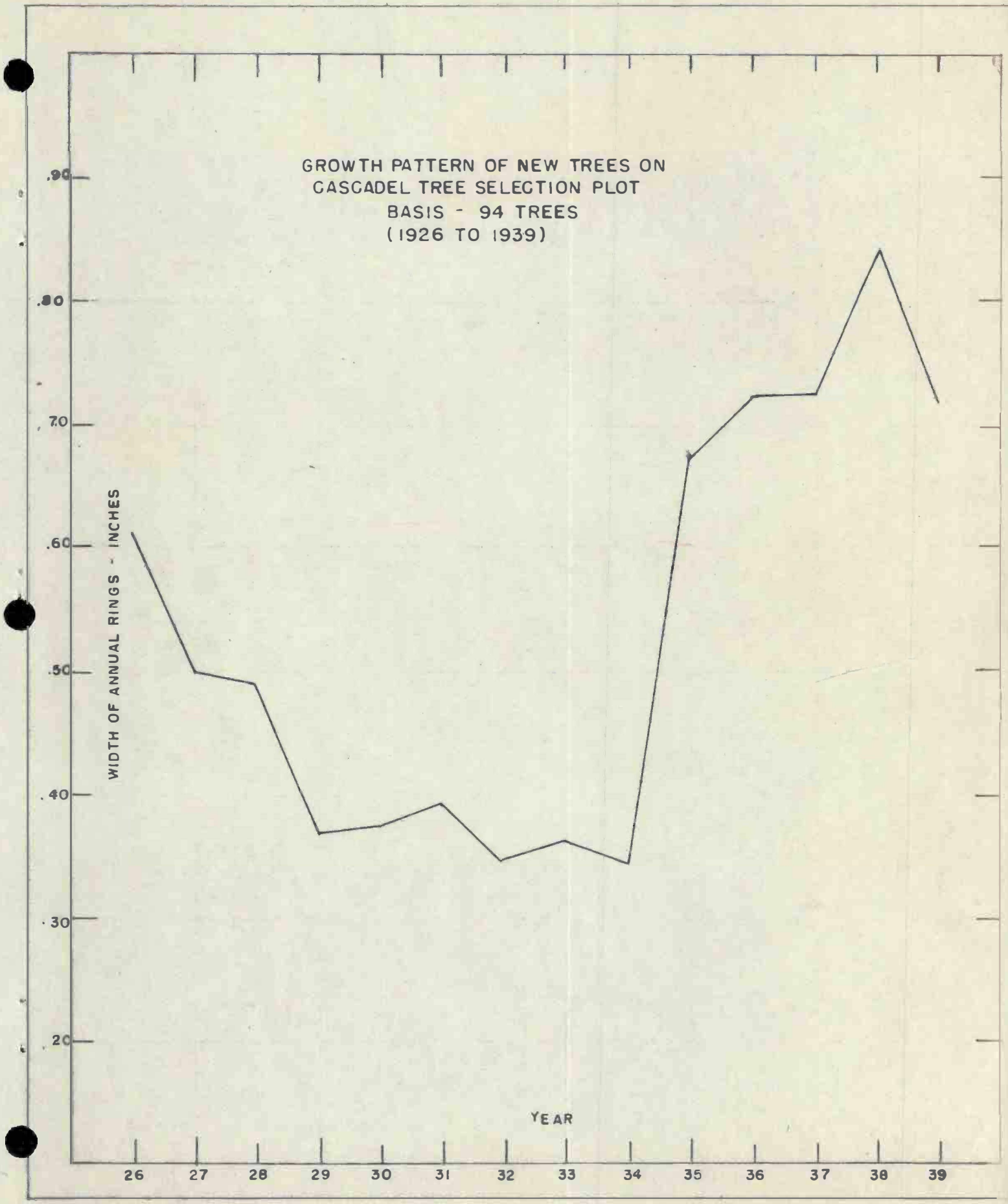
Plans

In studies planned for the immediate future on this plot, measurements of the amount of increment occurring in the living original stand since establishment will be made in order to determine how much growth has off-set the loss in volume. This will be done by taking increment cores from 2 trees representing each 4-inch diameter group from each 10 acres of the entire plot. A total of 128 cores will be taken as a representative sample, from which to calculate the total amount of increment on the plot.

Little information has as yet been obtained on the reasons why certain trees are selected for attack by the western pine beetle. Whereas Person showed a rather definite correlation between slow-growing trees and attacks by the western pine beetle, there were too many exceptions, particularly during the epidemic of 1931, to make it hold. Obviously Person's second objective "to determine the type of tree most susceptible to attack and how it differs from the average for the stand", is the one that should be studied, but so far we have no information on it for the selection plot

or for the westside pine type. When Person set up the Cascadel plot he classified each tree according to one of four degrees of dominance. Since then, great improvements have been made in rating trees according to certain physical characteristics.

In plans to be considered in future studies on this plot, all living trees should be rechecked and the records should be brought up to date in accordance with Dunning's and Keen's systems. Each tree should be risk rated according to a system applicable to the westside pine type. Following this there should be an annual check of insect losses to study the type of trees killed, insects responsible, and the intensity of attacks and brood.


GROWTH PATTERN OF NEW TREES ON
CASCADEL TREE SELECTION PLOT
BASIS - 94 TREES
(1926 TO 1939)
WIDTH OF ANNUAL RINGS - INCHES
.90
.80
.70
.60
.50
.40
.30
.20
YEAR
26
27
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